

# **Appendix E**

## **Disease Ascertainment Algorithms**

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To evaluate the relationship of individual chronic diseases and disability, it was essential to ascertain the presence of each of the major chronic diseases and conditions in a uniform and rigorous manner. To accomplish this, state-of-the-art clinical and epidemiological criteria for determining the presence of diseases were selected. For certain diseases (e.g., rheumatoid arthritis and osteoarthritis), decision trees were available with explicit criteria for disease presence as well as level of certainty. For other diseases, the Disease Ascertainment Working Group developed decision algorithms that would use the data collected in the Women's Health and Aging Study (WHAS).

Algorithms are presented on the following pages for the 17 major chronic diseases and conditions ascertained in the WHAS (Figures E.1-E.17). The algorithms start with data from the baseline interview, the nurse's examination, and the participant's current medication list. For certain diseases, these data were insufficient and additional information was used to validate the presence of a disease. For a few diseases, additional evaluations, including radiographs of the hips or knees and blood tests (e.g., glycohemoglobin level for diabetes mellitus) were used to determine presence of disease. For many conditions, responses by the participant's primary care physician to a questionnaire were used to confirm the diagnoses (Appendix F). Surveillance procedures were used to obtain hospital or outpatient records when other data were not sufficient, and these were then reviewed by WHAS clinician-epidemiologist investigators to confirm the presence of disease (Appendix F).

A study was performed to evaluate the reliability of disease ascertainment algorithms. For each disease, participants' records were reviewed first by a medical abstractor using the disease algorithms. For each disease, 15 to 20 charts to be reviewed were chosen at random from three categories of disease (definite disease, possible disease, and no disease) by the medical records abstractor, based on the abstractor's initial classification. Three WHAS clinician-epidemiologists then independently applied the relevant data to the algorithm and classified the participants according to

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disease status. Kappa values were calculated to assess inter-rater reliability for each algorithm, and results for the 15 algorithms tested are shown in Table E.1. Where raters disagreed, the algorithms were modified appropriately and retested, resulting in complete agreement as to disease presence. Because of time constraints, algorithms for peripheral arterial disease (Figure E.4), and cancer (Figure E.17) had not been tested as of the time of publication.

**Table E.1: Inter-Rater Reliability of Disease Algorithms**

<u>Chronic disease</u>	<u>Kappa</u>	<u>Number of cases reviewed</u>		
		<u>Classification by first reviewer</u>	<u>Definite disease</u>	<u>Possible disease</u>
Angina pectoris	1.00		7	5
Myocardial infarction	1.00		5	5 <sup>1</sup>
Congestive heart failure	1.00		5	5
Hip fracture	1.00		5	0
Osteoporosis	1.00		5	5
Osteoarthritis of the knee	1.00	10 <sup>2</sup>	0	5
Osteoarthritis of the hip	0.93	10 <sup>2</sup>	5	5
Osteoarthritis of the hand	1.00	10 <sup>2</sup>	5	5
Rheumatoid arthritis	0.90		5	5
Degenerative disc disease	1.00		5	5
Spinal stenosis	1.00		5	5
Stroke	1.00		1	5
Parkinson's disease	0.80		5	0
Pulmonary disease	0.93	13 <sup>3</sup>	3	5
Diabetes mellitus	0.80		5	5

<sup>1</sup> Silent myocardial infarction, by ECG

<sup>2</sup> Five cases definite and symptomatic, 5 cases definite and asymptomatic

<sup>3</sup> Including definite asthma, emphysema or bronchitis

## How to read the algorithms

Each algorithm traces the decision pathways in the explicit criteria for disease presence and level of certainty. The data elements and their sources are specified, indicated in the algorithms as follows:

**Boldface type:** These elements come from the participant, either from the screener or baseline questionnaire (Appendix B). The question number is usually presented in the box and the required response or value indicated in the pathway.

**Double outlined box:** These elements come from the nurse's examination (Appendix D) or additional evaluations such as blood tests and hip and knee radiographs (Appendix F).

**Italics:** These elements come from surveillance, including the physician questionnaire ("MD Questionnaire") and medical record abstraction (Appendix F). Question numbers appearing in the surveillance boxes refer to items in the baseline questionnaire that asked the participant to name a doctor or hospital where a diagnosis was made or treatment was received.

**Medications box:** If medication use was considered in the algorithm, the medications of interest are specified separately in a box.

**References:** Algorithms that were derived from existing criteria are referenced on the algorithm, with the full citations given below.

### Abbreviations:

**DK:** The source (e.g., the participant or physician) does not know whether something occurred or had been diagnosed.

**NA, Not Avail:** The item could not be located, for example the record could not be found or the physician questionnaire was not completed.

## References Cited in Algorithms

Acheson RM, Collart AB, Greenberg RH, Clemett AR. (1969). New Haven Survey of Joint Disease: Photograph and other variables in screening for arthritis of the hands. *Am J Epidemiol* 90:224-235.

Altman RD. (1991). Classification of disease: Osteoarthritis. *Sem Arthritis Rheum* 20(Suppl. 2):40-47.

Arnett FC, Edworthy SM, Bloch DA, McShane DJ, Fries JF, Cooper NS, Healey LA, et al. (1988). The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum* 31:315-324.

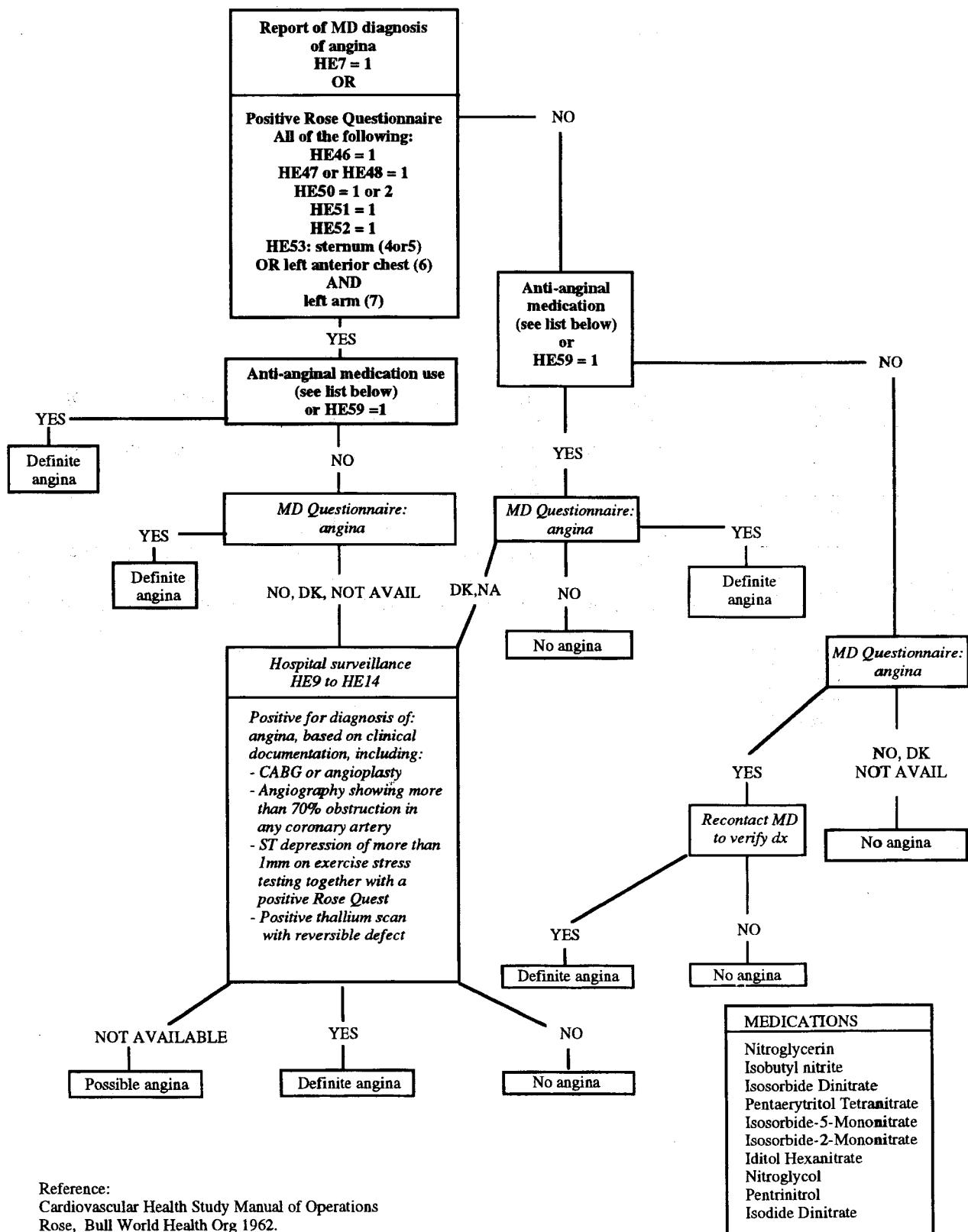
Cardiovascular Health Study. (1990). Manual of Operations. Vol. 1 protocol. CHS Coordinating Center, University of Washington, JD-30, 1107 NE 45th Street, Suite 530, Seattle, WA 98105.

Ferris BG Jr. (1978). Epidemiology Standardization Project (American Thoracic Society). *Am Rev Respir Dis* 118(Suppl.):1-120.

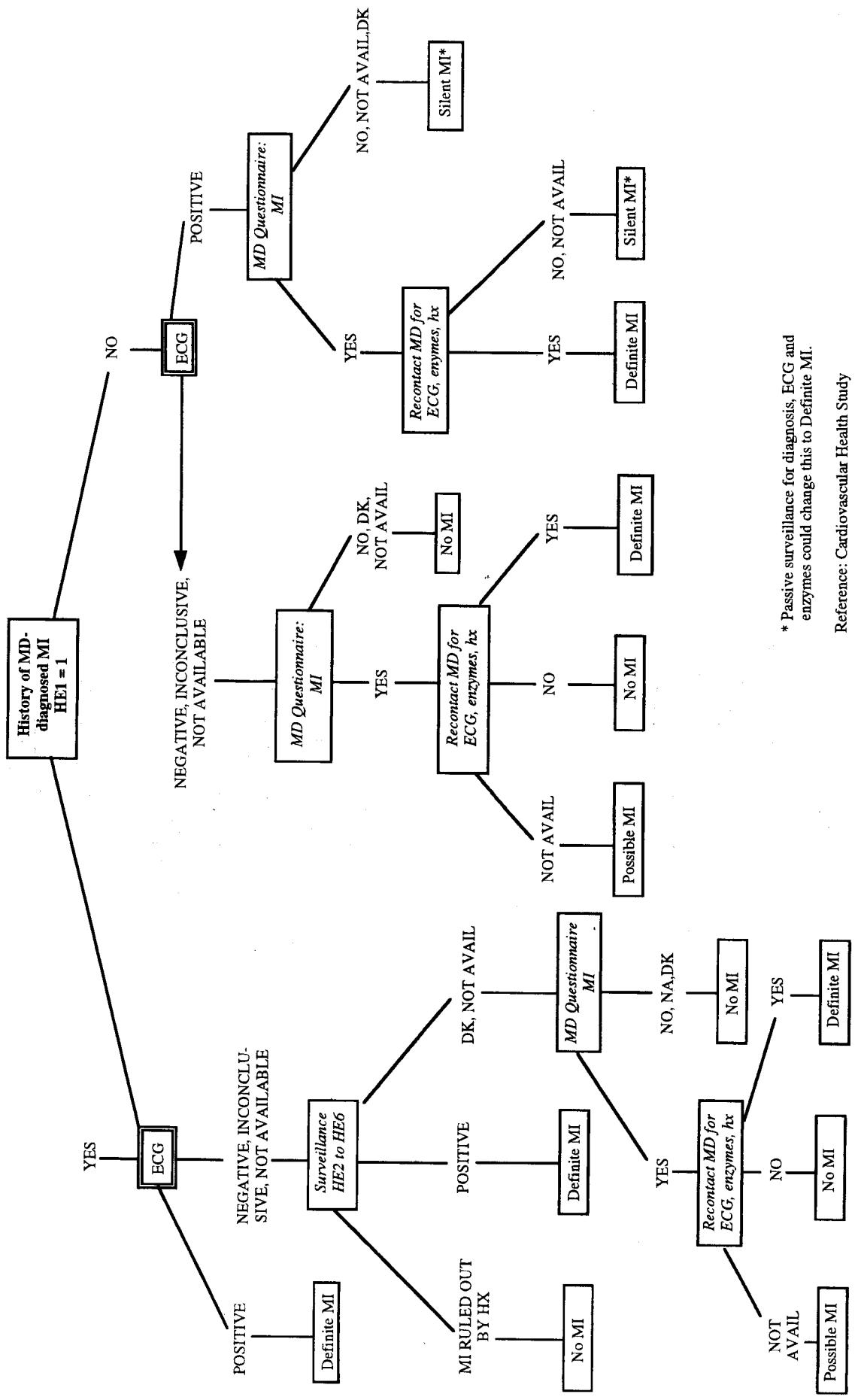
National Center for Health Statistics. (1994). Plan and operation of the Third National Health and Nutrition Examination Survey, 1988-94. *Vital Health Stat*, series 1, no. 32.

Rose G. (1962). The diagnosis of ischaemic heart pain and intermittent claudication in field surveys. *Bull WHO* 27:645-658.

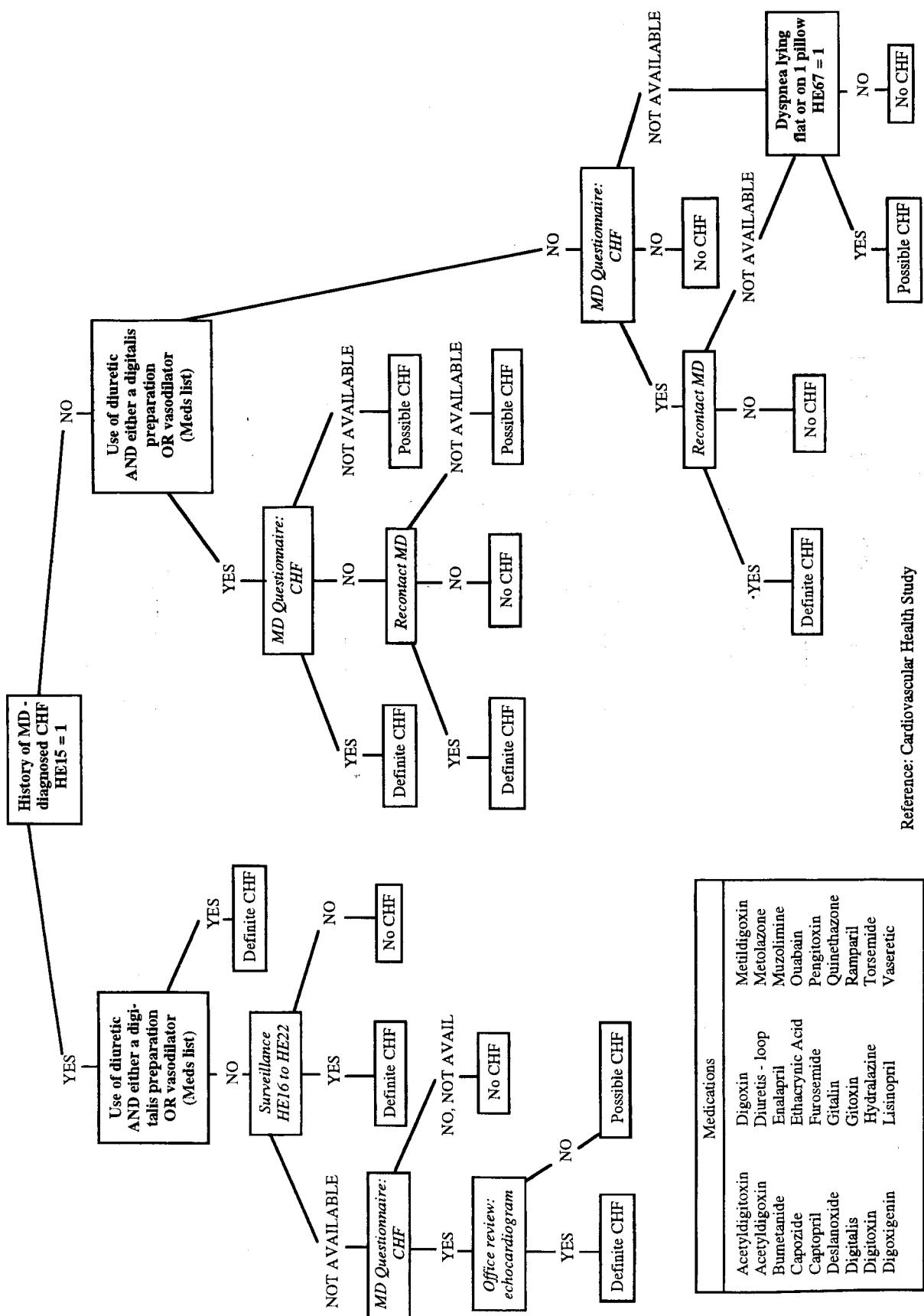
**Figure E.1: PREVALENT AND INCIDENT ANGINA**



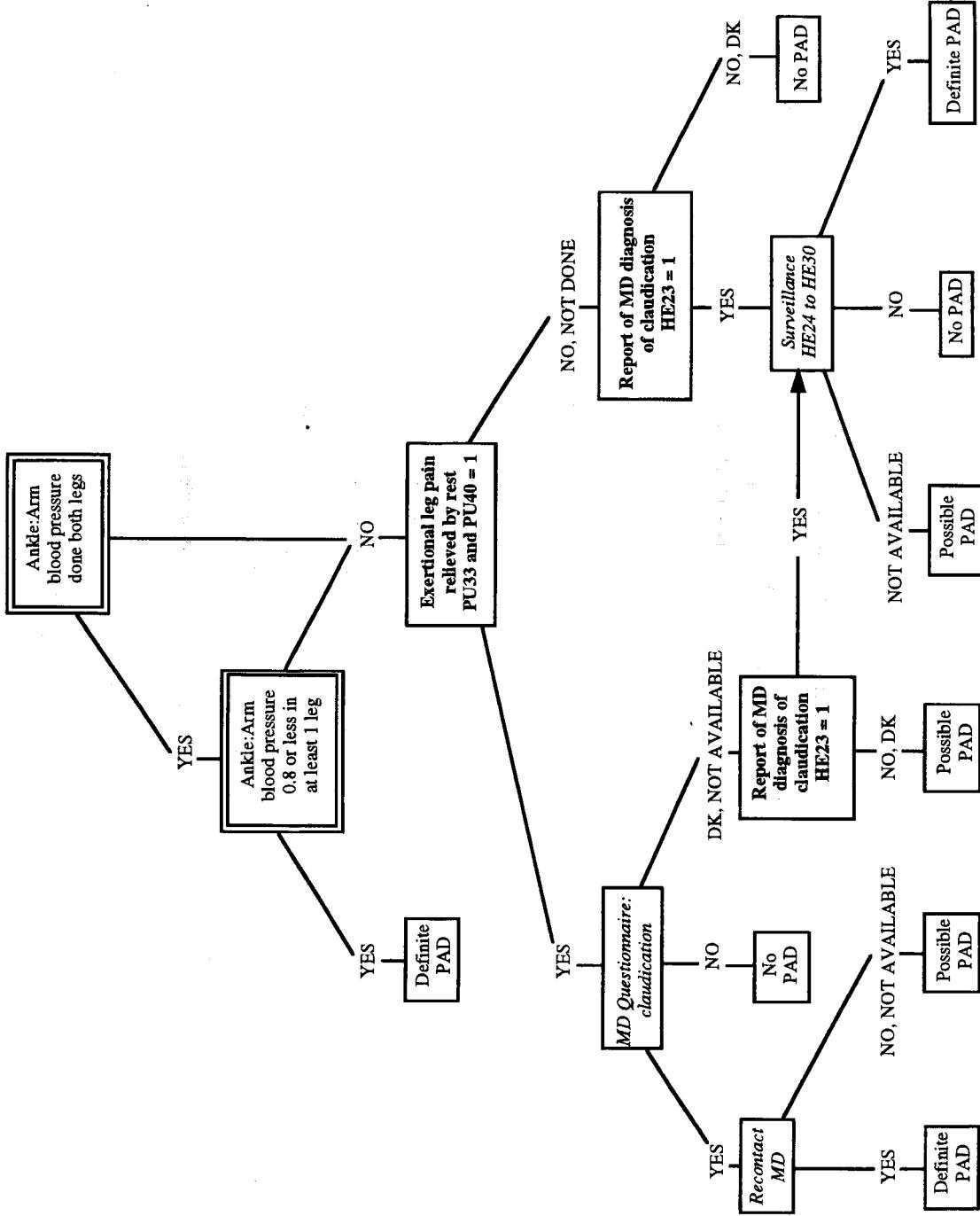
**Figure E.2: PREVALENT MYOCARDIAL INFARCTION**



**Figure E.3: PREVALENT CONGESTIVE HEART FAILURE**

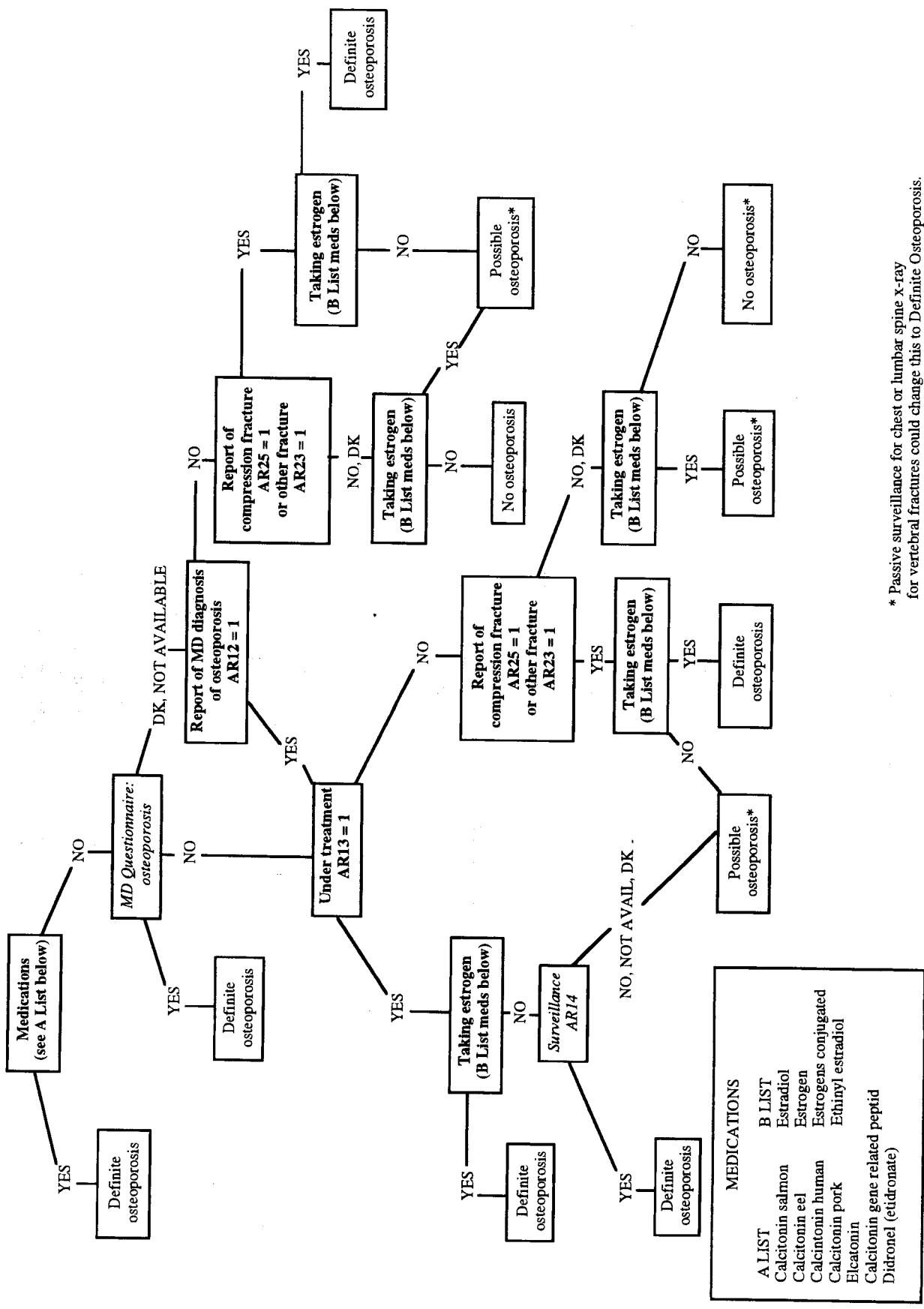


**Figure E.4: PREVALENT PERIPHERAL ARTERIAL DISEASE**

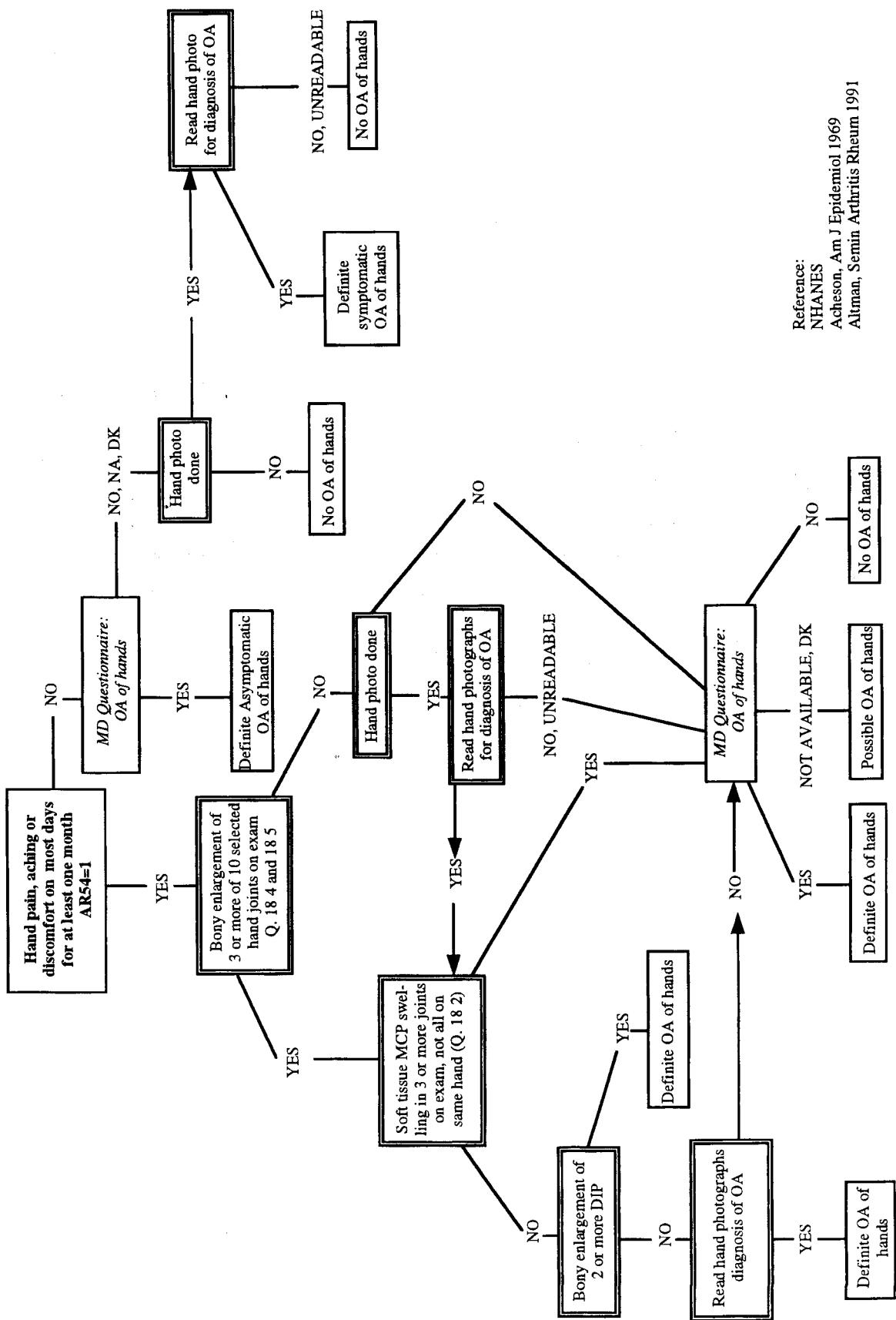


## Reference: Cardiovascular Health Study

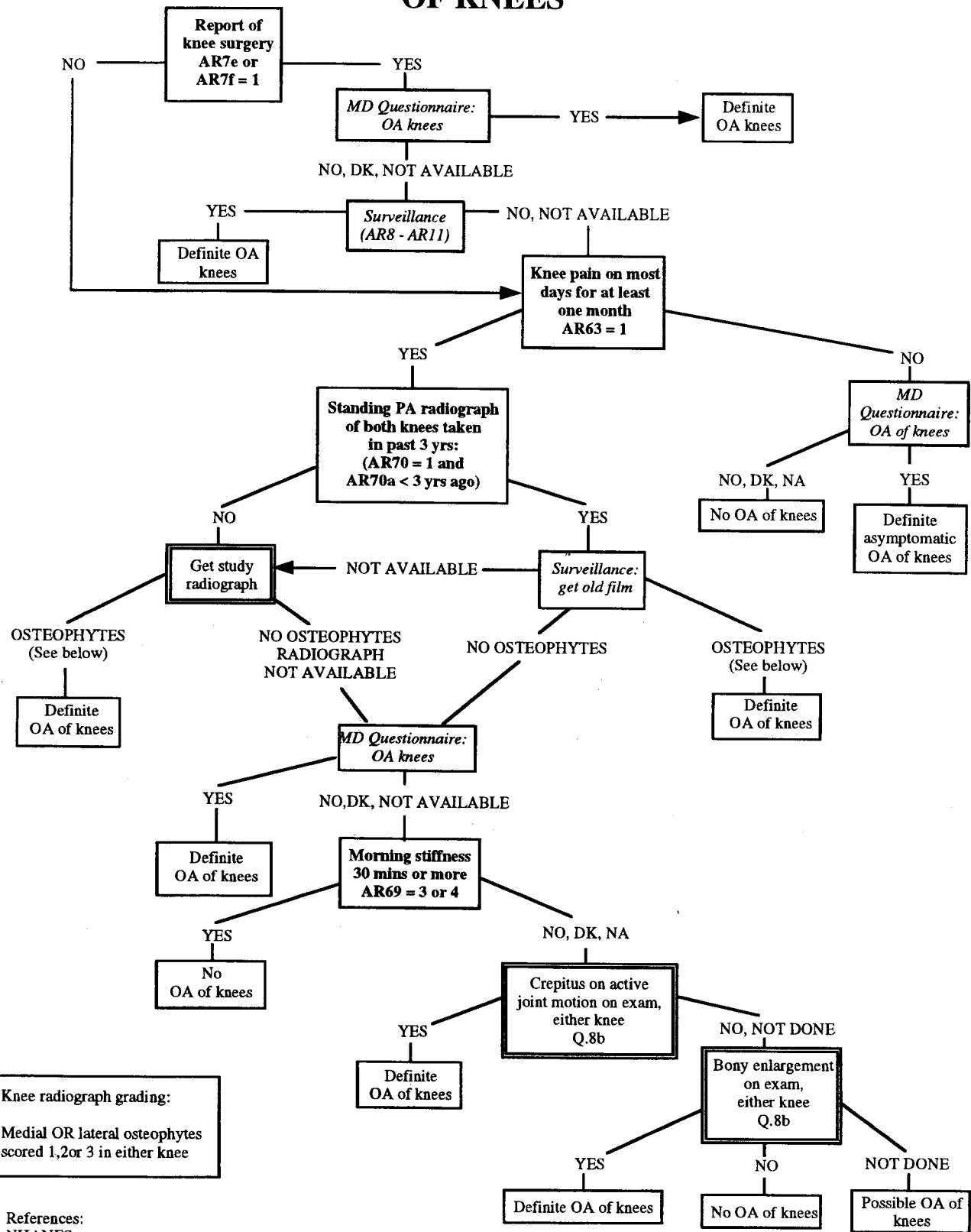
## Figure E.6: PREVALENT OSTEOPOROSIS



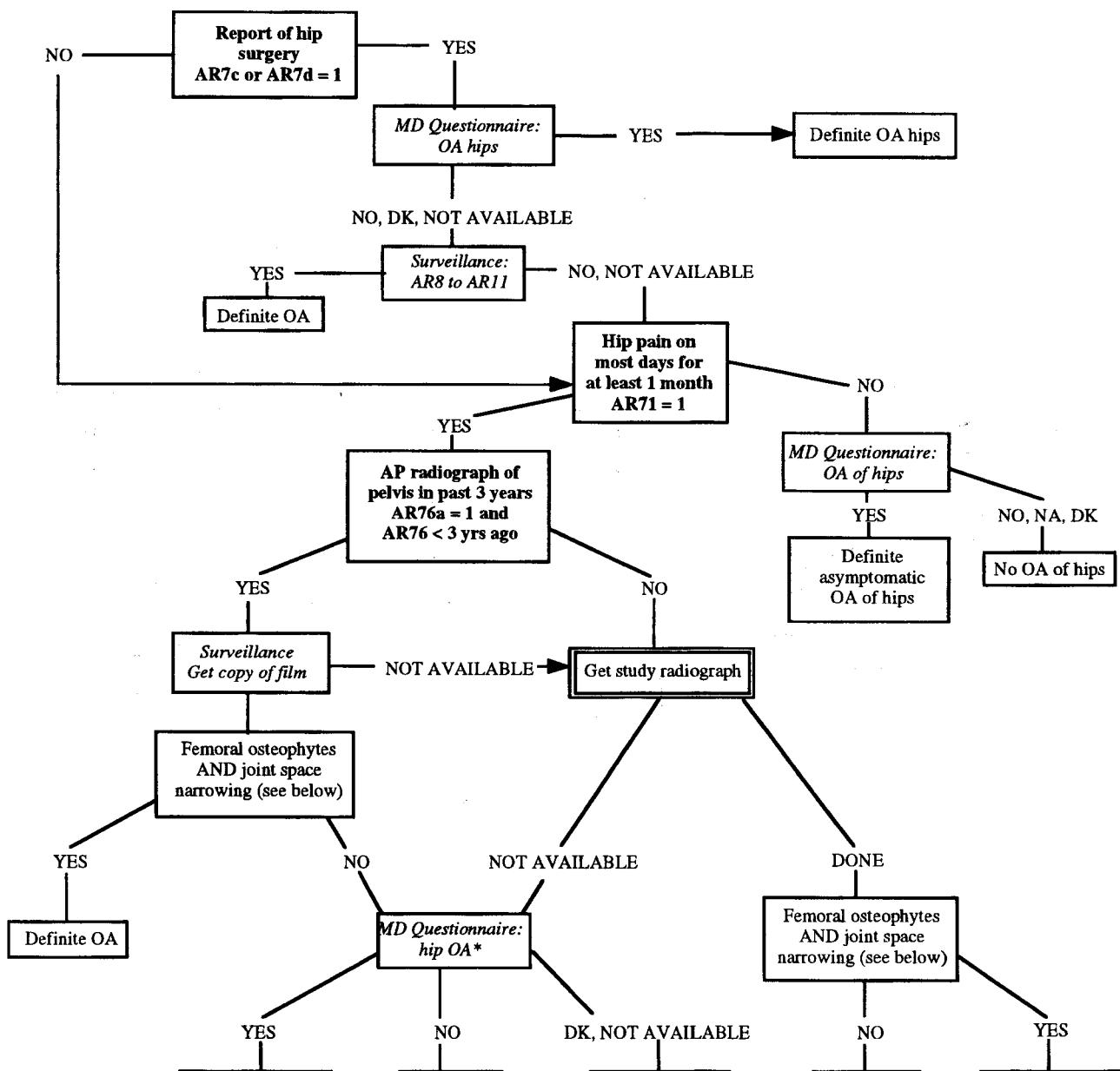
**Figure E.7: PREVALENT SYMPTOMATIC OSTEOARTHRITIS OF HANDS**



**Figure E.8: PREVALENT SYMPTOMATIC OSTEOARTHRITIS OF KNEES**



**Figure E.9: PREVALENT SYMPTOMATIC OSTEOARTHRITIS OF HIPS**

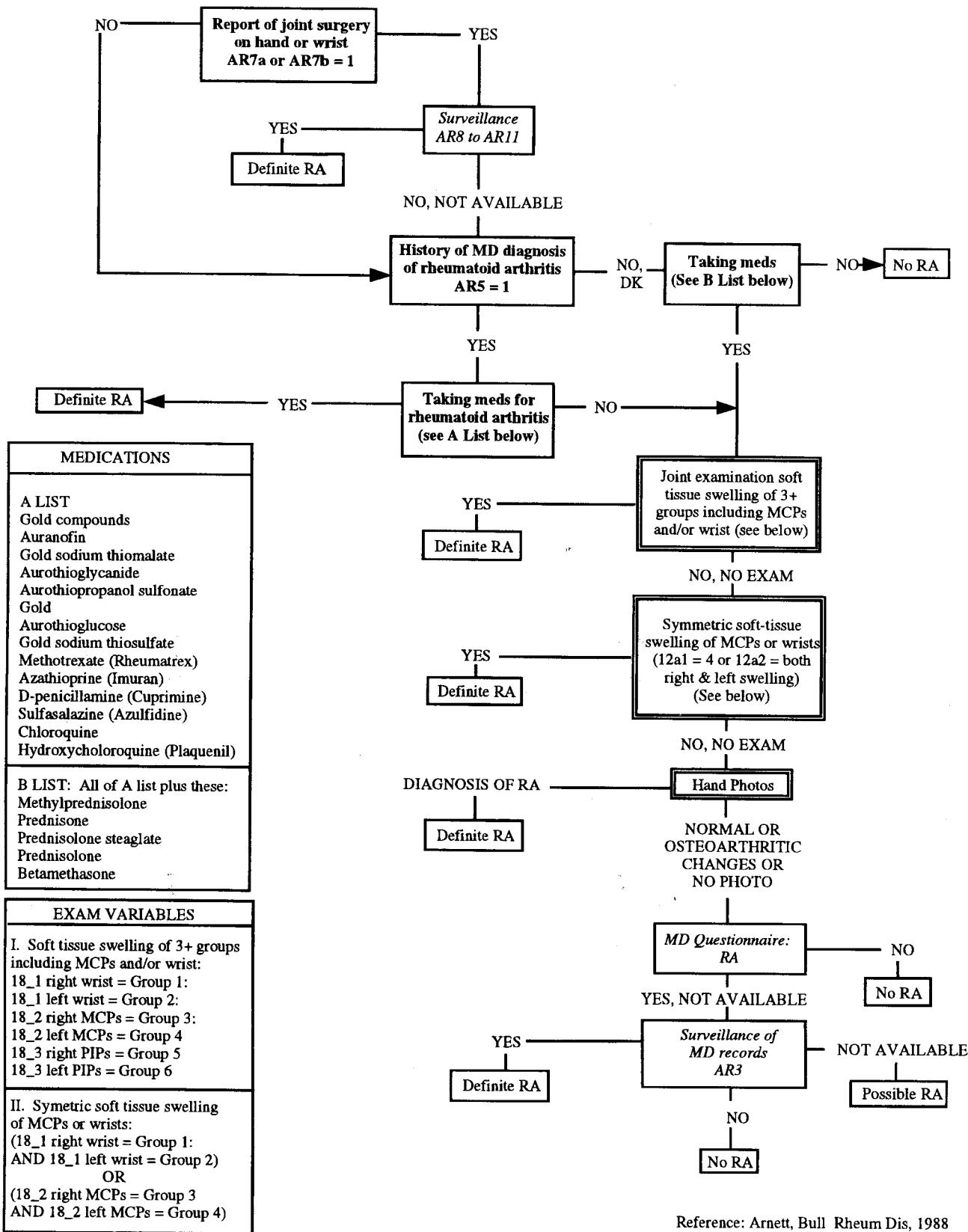


**Hip radiograph scoring:**  
(Femoral osteophytes scored 1,2 or 3) AND  
(Medial narrowing OR superior narrowing scored 1,2 or 3)  
These must occur on the same side.

\* MD questionnaire takes precedence, recognizing that subjects could have developed OA since surveillance x-ray was obtained.

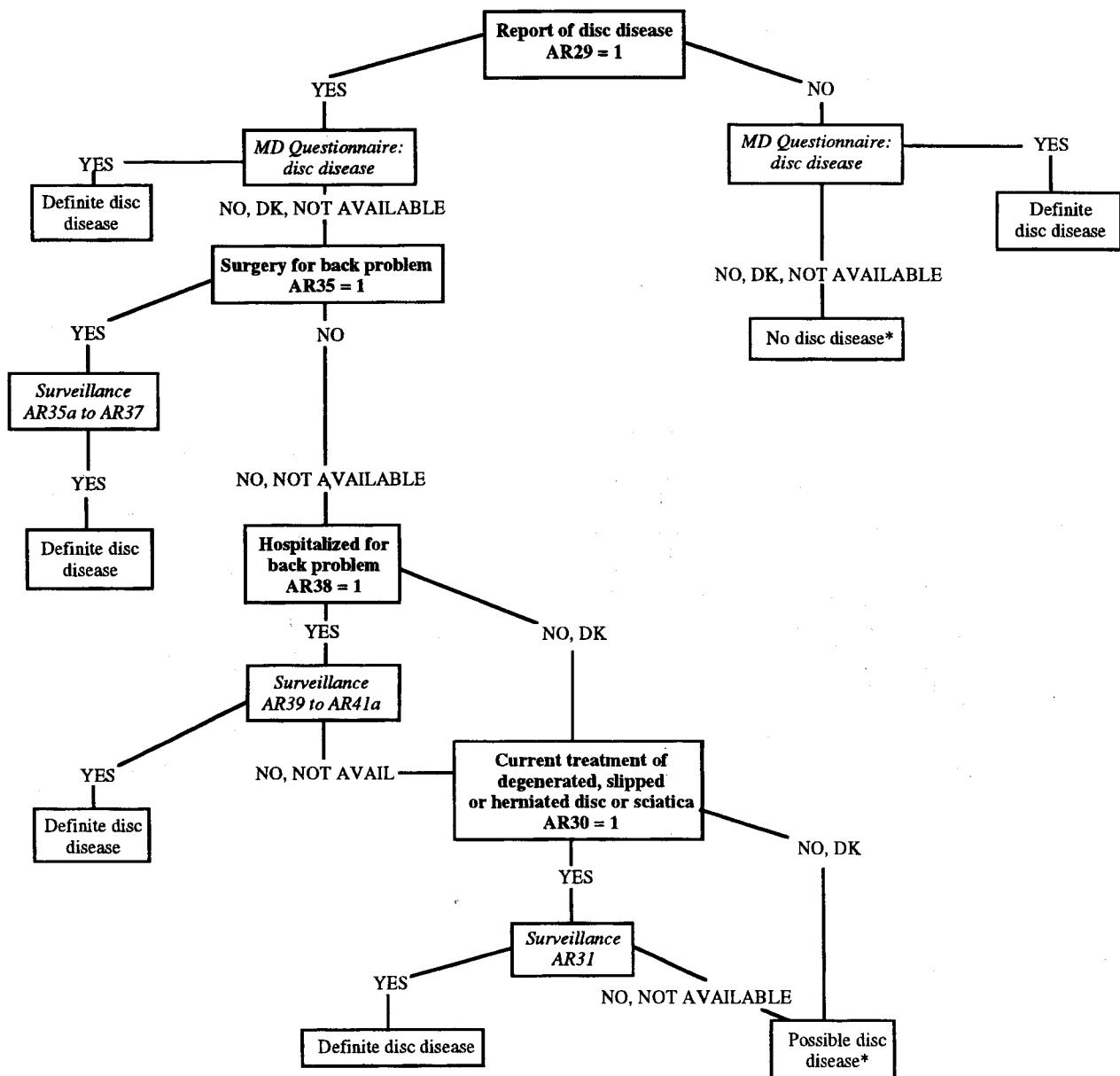
Reference:  
NHANES  
Altman, Semin Arthritis Rheu, 1991

# Figure E.10: PREVALENT RHEUMATOID ARTHRITIS



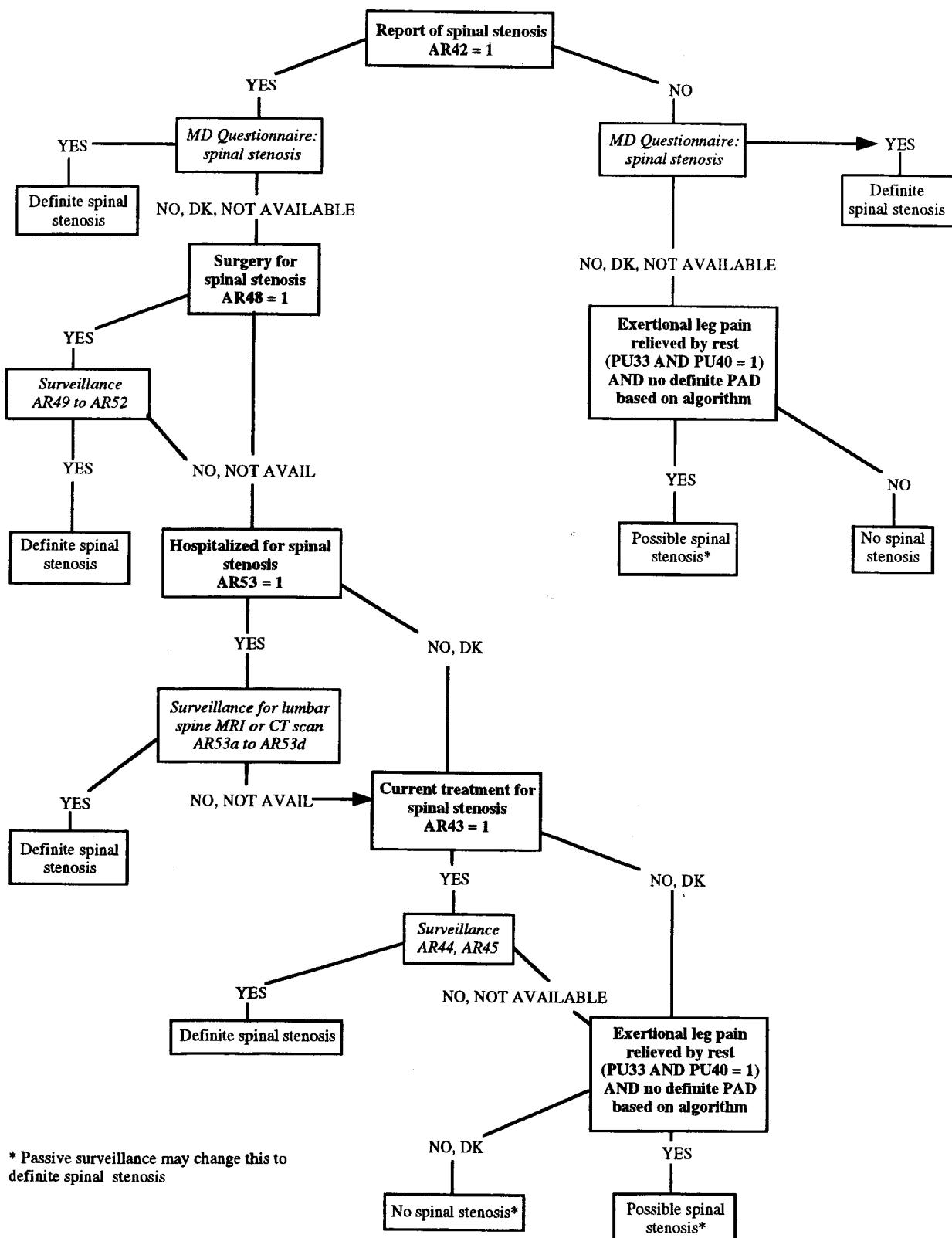
Reference: Arnett, Bull Rheum Dis, 1988

**Figure E.11: PREVALENT DISC DISEASE**

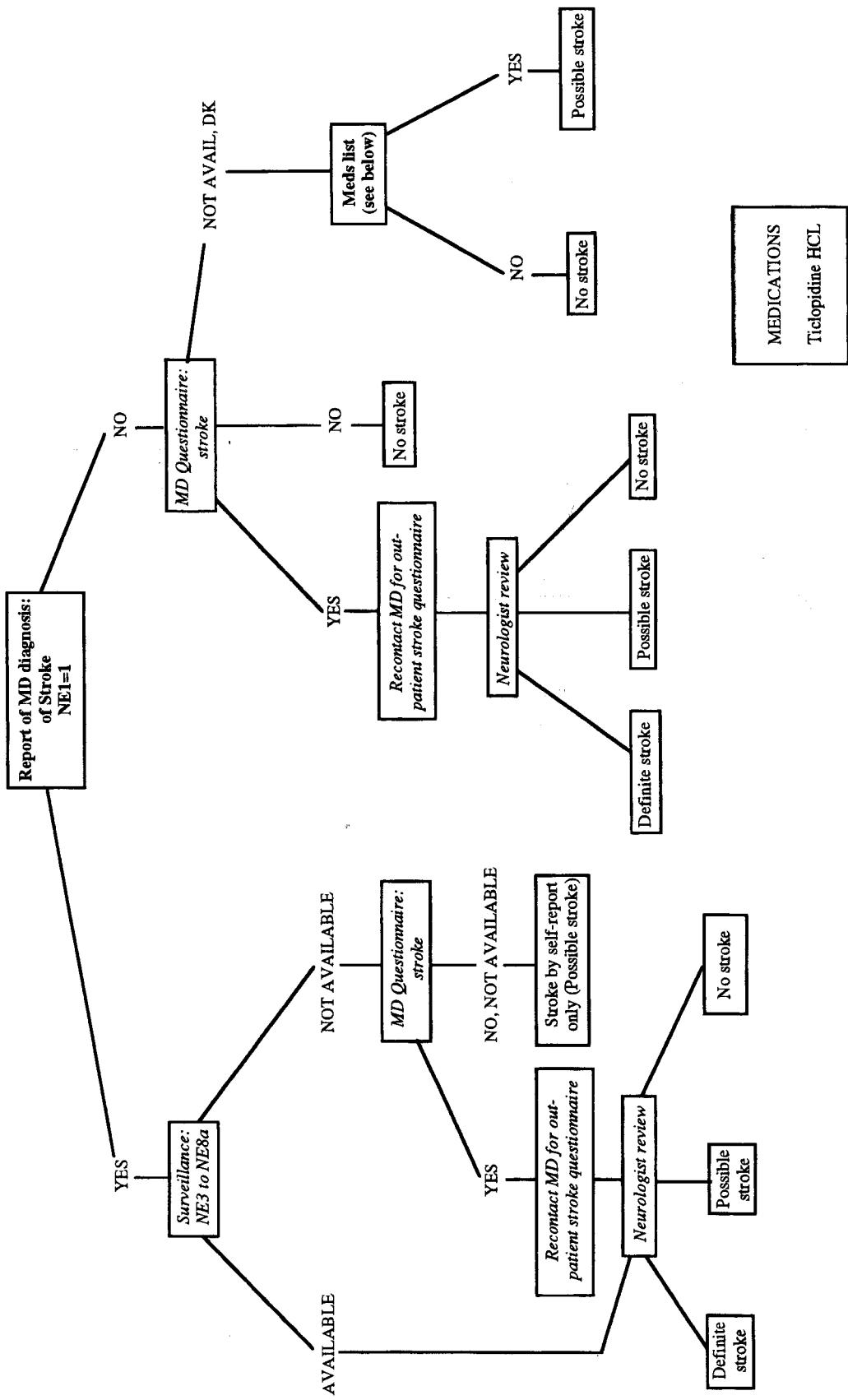


\* Passive surveillance may change this to Definite Disc Disease.

**Figure E.12: PREVALENT SPINAL STENOSIS**



**Figure E.13: PREVALENT STROKE**



Reference: Cardiovascular Health Study

**Figure E.14: PARKINSON'S DISEASE**

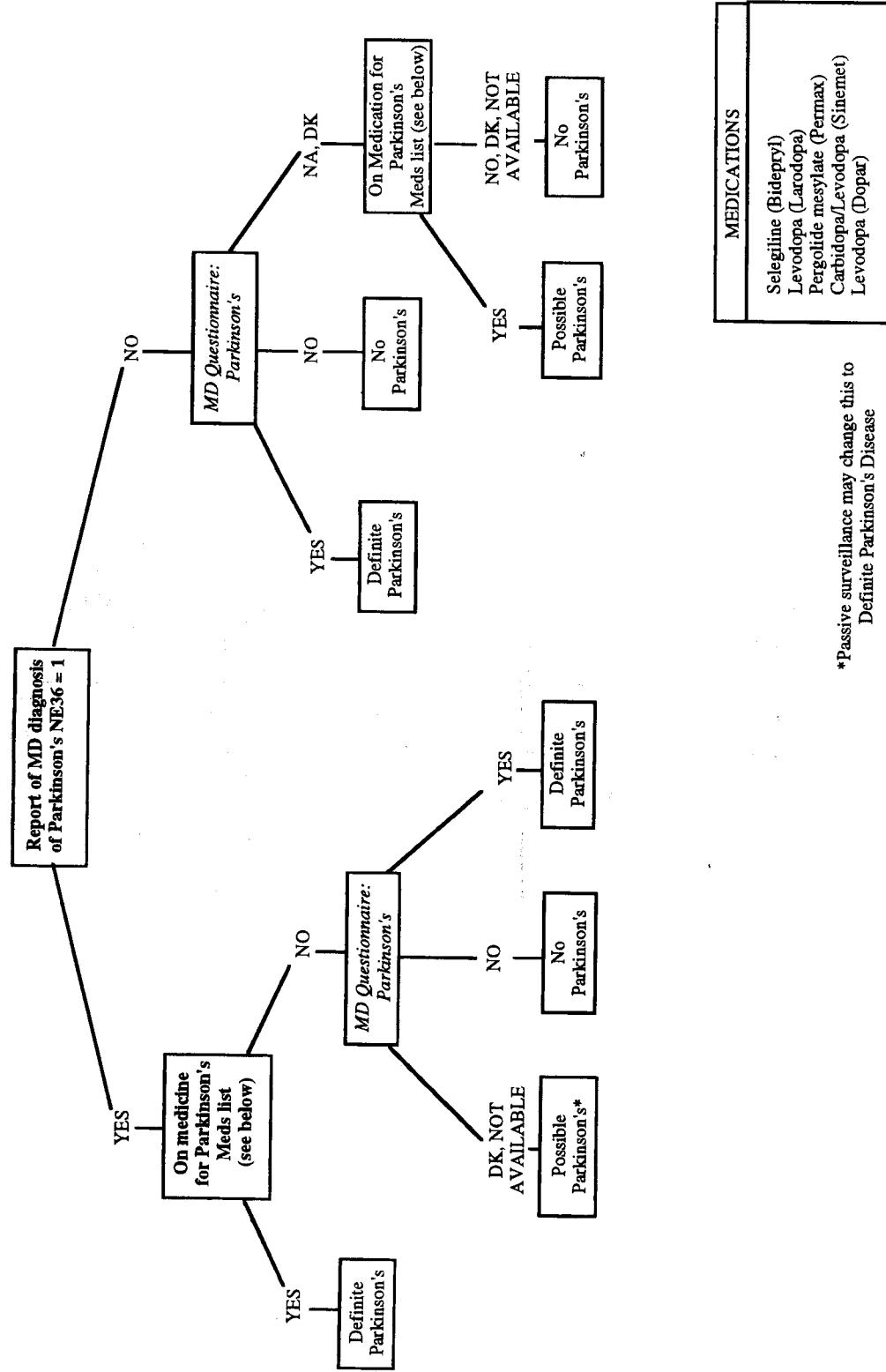
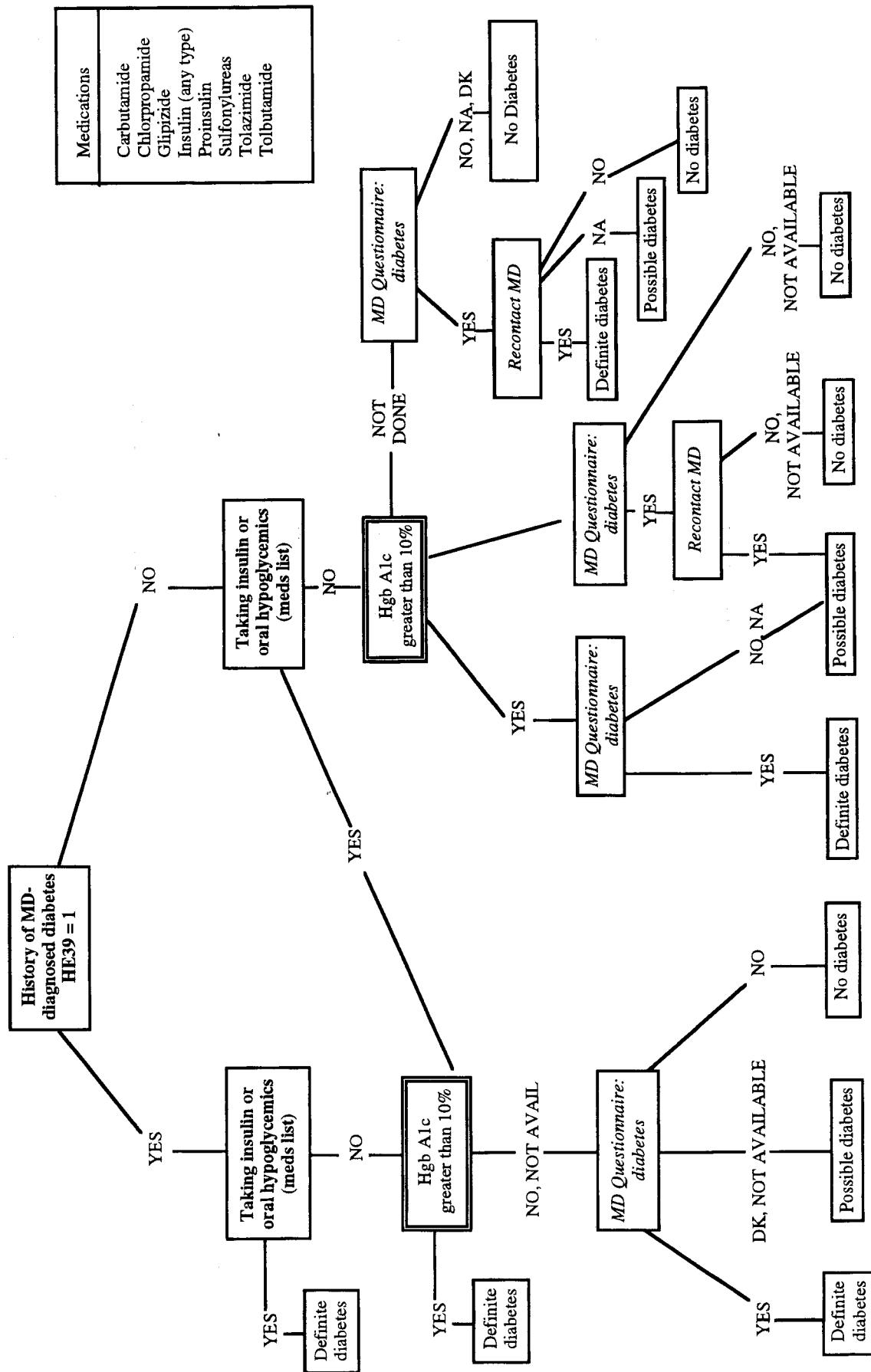
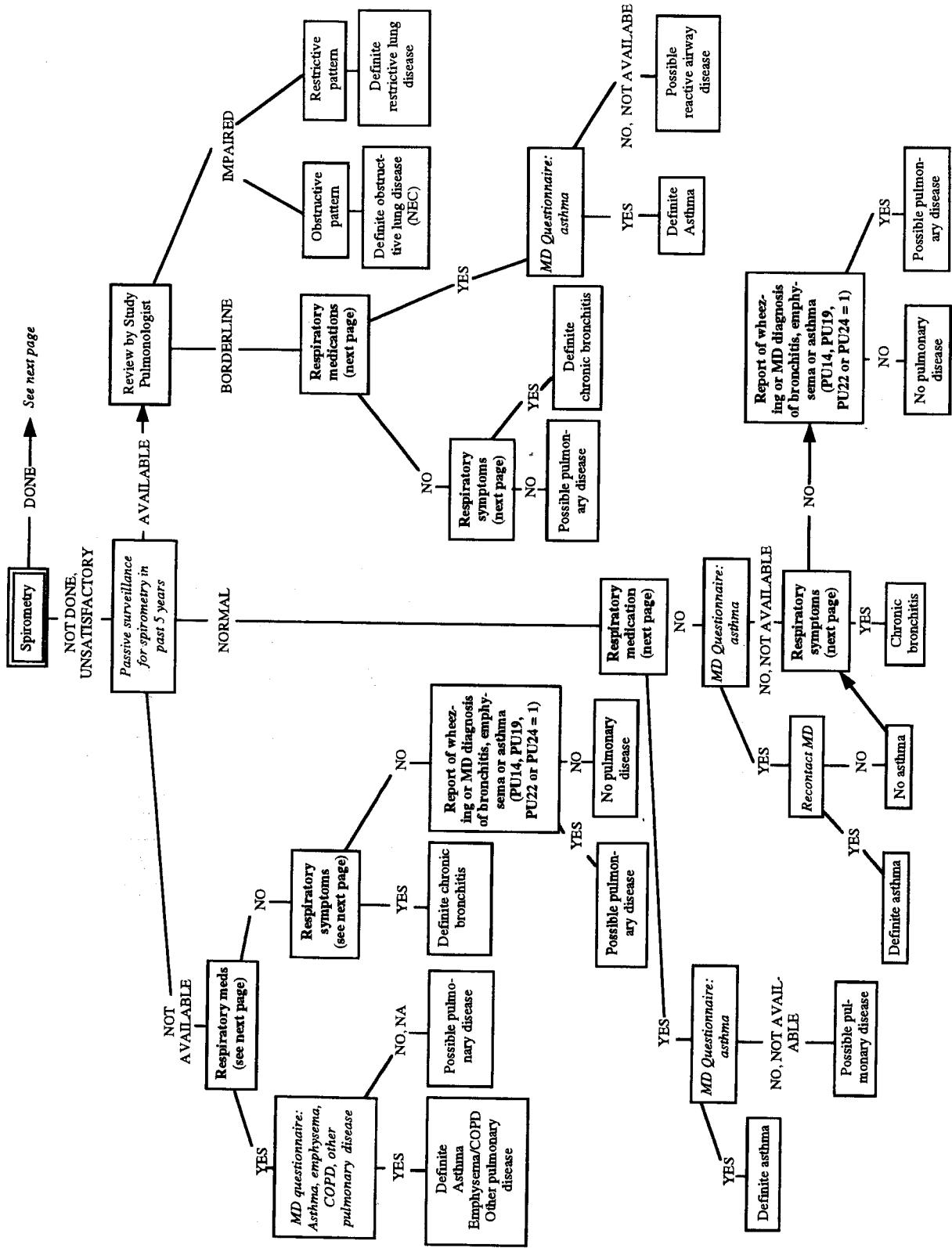


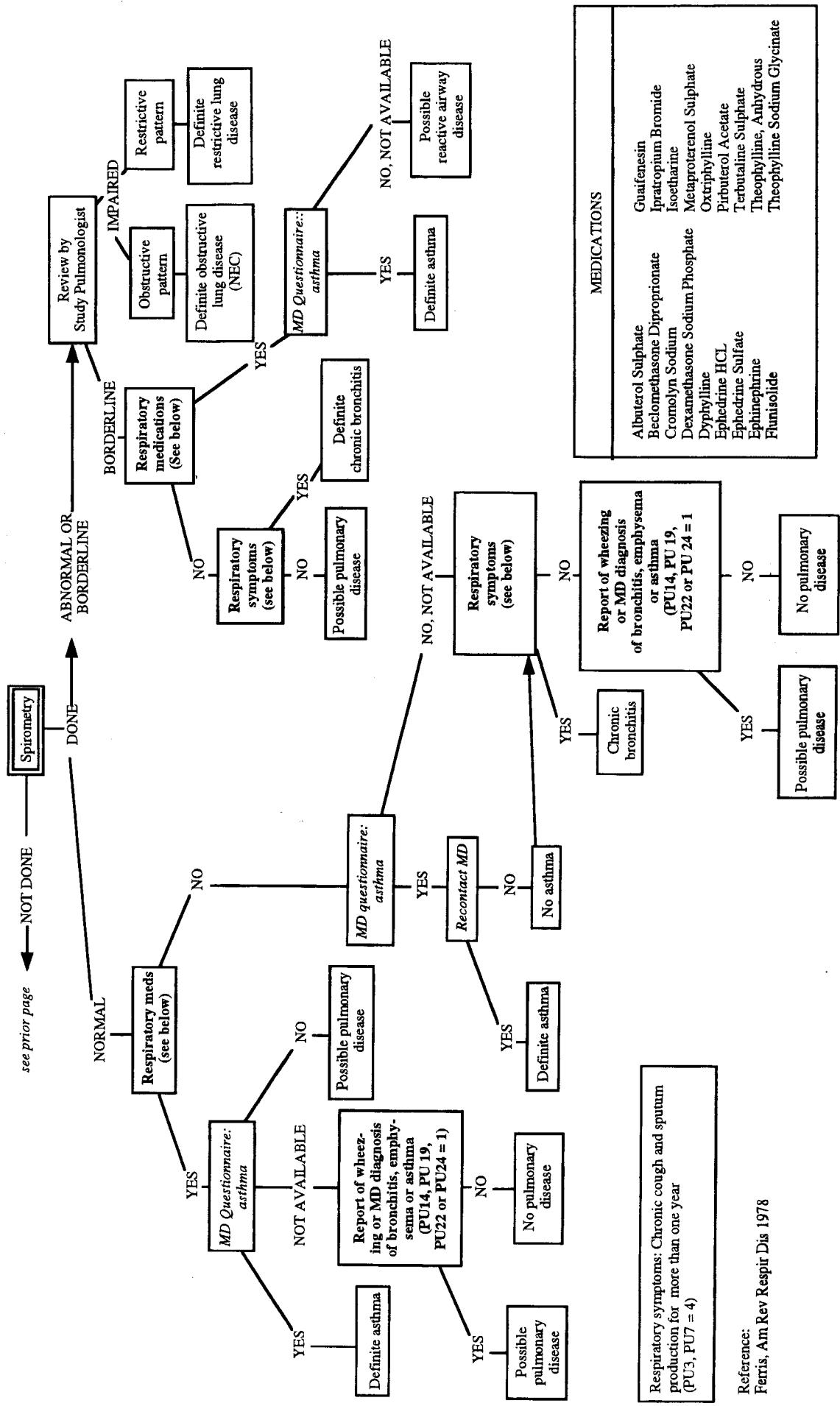
Figure E.15: PREVALENT DIABETES MELLITUS



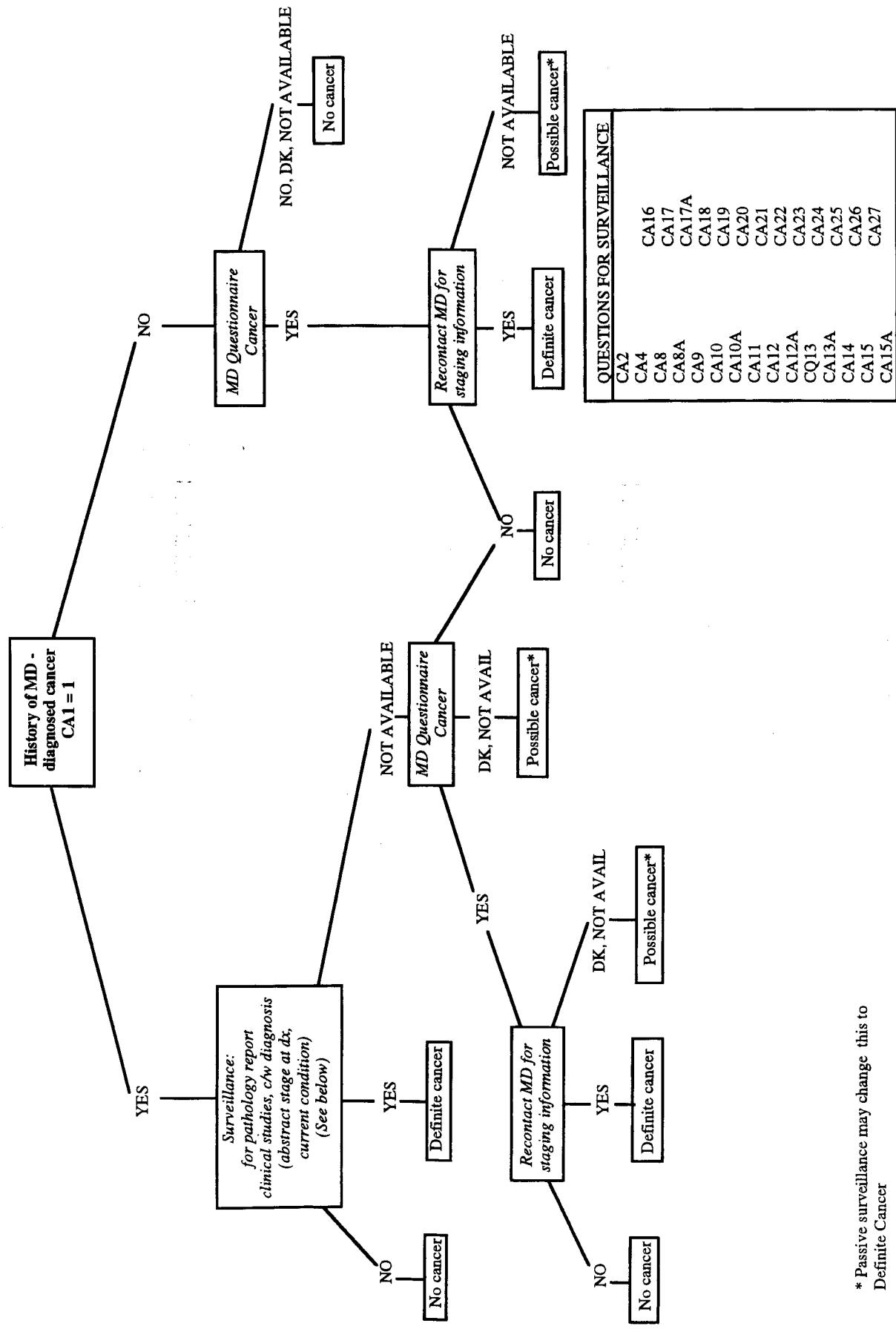
**Figure E.16: PULMONARY DISEASE (page 1 of 2)**



**Figure E.16: PULMONARY DISEASE (Page 2 of 2)**



**Figure E.17: PREVALENT CANCER**



\* \* Passive surveillance may change this to  
Definite Cancer